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DEVELOPMENT OF A RELATIONAL-DESIGN DATABASE FOR PRESERVATION AND ANALYSIS OF HISTORIC MEASUREMENTS OF RADIONUCLIDES IN SOIL

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Between 1981 and 1986, in situ spectral gamma measurements were made from tracked vehicles as part of the Radionuclide Inventory and Distribution Program (RIDP) to document the distribution and develop inventories of 16 man-made radionuclides in surface soil from nuclear testing at the Nevada Test Site. To preserve and permit more precise geospatial and other electronic analysis of the data, the raw spectral gamma measurements (units of nanocuries/m2) were recovered from nine-track magnetic tapes, transferred to a flat-file database, and finally converted into a relational-design, desktop application in Microsoft Access 2000. To test the reliability of the measurement locations, the Nevada Grid Coordinate information was imported into Environmental Systems Research Institute (ESRI) ArcMap to compare against plots in the 1991 RIDP summary report and against known field points. The resulting RIDP Database allows users to create files of the location and concentration where each radionuclide was detected, or files of all gamma measurements associated with a particular nuclear test. Maps can be generated showing where particular radionuclides were detected. For additional analysis, datasets can be exported to a hypertext markup language (HTML) format.

Extensive use has been made of RIDP data prior to development of this database. However, there have been some inconsistencies in results because of use of interim results published prior to 1991, and because some half lives used when the data was collected are different than those used today. Two major steps were taken to standardize analysis using the RIDP database. First, only spectral gamma data decay corrected to January 1, 1990 was used. Second, currently accepted half lives for the radionuclides were incorporated into an option that allows decay correction of inventory and activity values since 1990. For long-lived radionuclides, changes in inventory have been inconsequential. However, for short-lived fission products (e.g., 60Co, half life of 5.27 years), changes because of radioactive decay were found to be significant. Comparison of spectral gamma data collected in 1994 from fixed winged aircraft to RIDP shows good correlation between areas of high contaminant concentration.

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